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ABSTRACT

Presented is a supplement to a previous list of references. Contained is a compilation of information collected by the Calculator Information Center between June 1979 and December 1980. Included are references which previously appeared on bulletins distributed by the Center, plus articles from newsletters and similar less readily available sources and from non-American sources. Most references are annotated; all include a limited set of descriptors or keywords which denote the focus or contents of the reference. At the end of the listing is an index for each descriptor. (Author/MP)

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Calculators:

A Categorized Compilation of References

Marilyn N. Suydam

Supplement 1
December 1980

Calculator Information Center
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Calculators: A Categorized Compilation of References

Since March 1977, the Calculator Information Center has met the dual functions of collecting and disseminating information about the use of calculators in education. This document lists references collected by the Center between June 1979 and December 1980, supplementing a previous compilation (Suydam, 1979). The majority of these references have appeared on Reference Bulletins distributed by the Center; two additional types of materials cited here did not appear in those bulletins:

(1) Articles from sources not readily available to wide audiences

(2) Articles and other documents from non-American sources.

No claim to comprehensiveness is made: readers are encouraged to send additional references to the Center. Omitted are approximately 400 references pertaining to applications which seem too specialized in intent for use in schools.

The alphabetized listing of references includes, in brackets, a limited set of descriptors or keywords which denote the focus or contents of the reference. At the end of the listing is an index to help the reader locate documents of interest. However, some descriptors which could have been applied to a particular reference might not be listed. Such omissions generally occurred because the descriptor did not come to mind as the reference was scanned. It is suggested that readers might add their own notes of studies appropriate in each category.

In the majority of instances, the references are annotated. In a small percentage of cases, however, no annotation is included; this occurred most often because the document was not available at the Center. The

descriptors should reflect what is known about the contents, as indicated by the title.

It is hoped that this compilation will be of aid to teachers, to researchers, and to others who need and want references on calculators.

Calculators: A Categorized Compilation of References
(Compiled June 1979-December 1980)

Aho, Carolyn and Shaff, Kristine. Calculator Math. CMC Communicator 5: ; April 1979.

[Activities]

Andersen, Lyle et al. Making Comparisons: Ratios, Topical Module for Use in a Mathematics Laboratory Setting. Denver, Colorado: Regional Center for Pre-College Mathematics, 1973. ERIC: ED 183 409.

The objectives of this module include comparing sets of objects and expressing ratios as decimals or fractions.

[Activities, Decimals, Fractions, Programmable calculators, Ratios, Secondary]

Attard, Alfred E. and Lee, Henry C. X-Ray Crystallographic Computations Using a Programmable Calculator. Journal of Chemical Education 56: 650; October 1979.

Crystallographic programs for chemical analysis are described.

[Chemistry, College, Post-secondary, Programmable calculators]

Banka, Don S. A Survey of Parents' Attitudes Toward Calculator Usage in Elementary Schools. South Bend, Indiana: University of Notre Dame, 1979.

Teachers in a workshop sent a 12-item questionnaire to parents and teachers of grades k-9; 334 responses were received. Parents were skeptical about the use of calculators in elementary grades. They agreed that calculators could be used for motivation, and along with paper-and-pencil computation, but expressed moderate disagreement with the use of calculators for homework and were very negative about replacing paper-and-pencil computation.

[Attitudes, Elementary (grades k-6), Junior nigh (grades 7-9), Parents, Research (survey), Roles, Teachers]

Barnes, John E. and Waring, Alan J. Pocket Programmable Calculator in Biochemistry. New York: Wiley, 1980.

[Biochemistry, Programmable calculators]

Belstock, Alan and Smith, Gerald R. Consumer Mathematics, with Calculator Applications. New York: McGraw-Hill, 1980.

[Consumer applications]

Berg, Gary A. Using Calculators for Business Problems. Chicago: Science Research Associates, 1979.

[Business, Post-secondary]

Berry, Herbert. Improving Achievement in Selected Skills of Functional Mathematics with the Use of the Electronic Hand-Held Calculator.

(New York University, 1979.) Dissertation Abstracts International 41A: 574; August 1980.

[Basic mathematics, Research]

Biondi, M.; Midoro, V.; and Pescetti, D. Use of Programmable Pocket Calculators in Engineering Introductory Courses. International Journal of Electrical Engineering Education 10: 128; 1979.

[College, Engineering, Programmable calculators]

Birtwistle, Claude. The Calculator Puzzle Book. England: Elliot Right Way Books, 1978. (Also New York: Bell Publishing Company, 1978.)

[Activities]

Bitter, Gary. Count on the Calculator! Teacher 96: 67-68ff; February 1979.

Use of calculators for elementary students is recommended, so that they may concentrate on the sense of a problem. Activities on place value, estimation, and operations are suggested.

[Activities, Elementary (grades 1-6), Estimation, Place value, Problem solving]

Bitter, Gary. Metric Corner: Converting with the Calculator. Teacher 97: 160; September 1979.

Patterns are presented that will help students determine the position of the decimal point or the number of zeros needed when converting.

[Activities, Decimals, Elementary, Four-function calculators, Measurement]

Bitter, Gary. What About Those Electronic Games? Teacher 97: 78-82; November-December 1979.

[Elementary, Games]

Bitter, Gary. Calculator Teacher Attitudes Improved Through Inservice Education. School Science and Mathematics 80: 323-326; April 1980.

No significant difference in attitudes toward calculators was found between primary, middle, and upper grade teachers. A two-hour workshop appeared to improve attitudes significantly.

[Attitudes, Research (survey), Teachers (in-service)]

Bitter, Gary. Calculator Corner: Meet the Calculator. Teacher 98: 81; August 1980.

Several suggestions are made to teachers concerning how they might introduce the features of a calculator to their students.

[Activities, Calculator keys, Calculator memory, Elementary, Four-function calculators, Teachers]

Bitter, Gary. Calculator Corner: Enter Problem-Solving. Teacher 98: 145; September 1980.

Calculator addition problems are presented within a problem-solving context.

[Activities, Addition, Elementary, Four-function calculators, Teachers]

Bitter, Gary. Calculator Corner: Subtracting with the Calculator. Teacher 98: 111; October 1980.

This calculator activity deals with subtraction of monetary amounts and includes ideas to introduce the concept of negative integers.

[Activities, Consumer applications, Elementary, Four-function calculators, Subtraction, Teachers]

Bitter, Gary. Calculator Corner: Multiplying with a Calculator. Teacher 98: 91; November-December 1980.

Multiplication on the calculator is introduced. That the user must sometimes use logic and imagination to arrive at a correct answer is emphasized.

[Activities, Elementary, Four-function calculators, Multiplication, Teachers]

Bitter, Gary and Mikesell, Jerald. Activities Handbook for Teaching with the Hand-Held Calculator. Boston: Allyn & Bacon, 1980.

Activities, grouped by mathematical topic, are given for exploring calculator applications in the elementary and junior high curriculum.

[Activities, Calculator keys, Curriculum, Elementary, Junior High, Teachers]

Blakeley, Barry. Calculator Corner. Mathematics in School 9: 25; March 1980.

A calculator activity is presented in which a student tries to get an answer before the calculator does.

[Activities, Four-function calculators]

Blume, Glendon W. A Calculator-Based Unit on Exponential Functions and Logarithms. Computing Teacher 6: 47-49; May 1979.

Calculator-based activities are provided, with worksheets on population growth and inflation.

[Activities, Algebra, Functions, Secondary, Units, Worksheets]

Boardman, Harold. Programmable Calculators: Computer Power in Pocket-Size Packages. Popular Science 214: 77; May 1979.

Programming with the TI-59 calculator is described; the advantage of the printing capability is noted.

[Post-secondary, Programmable calculators, Selection]

Bone, Dorothea D. Sine and Cosine Functions with a Calculator. Mathematics Teacher 73: 521-524, 529; October 1980.

Calculator activities are presented that involve discovering patterns of the sine and cosine functions, rounding numbers to the nearest

hundredth, plotting points, drawing graphs, and using a protractor.

[Activities, Secondary (grades 9-12), Trigonometry, Worksheets]

Bowsher, J. M. Calculator Program for Musical Notes. Journal of the Audio Engineering Society 28: 437; 1980.

[Music]

Boyle, Patrick J. Cagey Calculation. School Science and Mathematics 77: 697-698; December 1977.

Some activities in which the calculator is used to spell words are given.

[Activities, Four-function calculators]

Brabson, G. Dana and Seegmiller, David W. Programmable Calculators Add a New Dimension to Laboratories. Journal of Chemical Education 47: 117-119; February 1970.

Using a programmable calculator in chemistry experiments is described, with advantages and features of various models noted.

[Chemistry, College, Desk calculators, Programmable calculators, Pros/cons, Selection (features)]

Bradbeer, Robin and Bawtree, Michael. The Sinclair Book of Students' Calculations. Cambridge, England: Martin Books, 1979.

[Activities]

Briggs, William L. Romberg Integration and Extrapolation Methods. Didactic Programming 2: 2-6; Fall 1979.

The proposed method generalizes the common quadrature rules in a systematic way.

[Calculus, College, Programmable calculators]

Bristol, James D. The Programmable Calculator a Computer, a Teacher Aid. Ohio Journal of School Mathematics 3: 2-8; November 1979.

Specific examples of how the calculator can be used to develop mathematical ideas are provided.

[Algebra, Functions, Roots, Secondary]

Brolin, Hans. The ARK-Project: Analysis of the Consequences of Pocket Calculators in Swedish Schools. Paper presented at the ICME-IV meeting in Berkeley, August 10-16, 1980.

[Curriculum, Elementary, Junior high, Research, Secondary]

Brown, Lynn. Programmable Calculator Activities for Grades 7-12. Math Lab Matrix 12: 4-5; Fall 1979. Normal: Illinois State University, Mathematics Department.

[Activities, Junior high, Programmable calculators, Secondary]

Buckwalter, L. Big Brains for Little Calculators. Mechanix Illustrated 74: 80ff; February 1978.

[Building]

Burt, Bruce C. (editor). Calculators: Readings from the Arithmetic Teacher and the Mathematics Teacher. Reston, Virginia: National Council of Teachers of Mathematics, 1979.

Articles from the two journals are reproduced.

[Activities, Elementary, Junior high, Recommendations, References] (selected)

Campbell, Joseph K. Little Package, Big Deal. Journal of Extension 17: 34-37; May-June 1979.

Use of programmable calculators in place of computers in New York State's University extension services is described.

[Post-secondary, Programmable calculators]

Carnihan, Hilary. Danny's Method of Subtraction. Mathematics Teaching 89: 6; December 1979.

A lesson on subtraction using negative numbers is described.

[Elementary (grades 3, 4), Four-function calculators, Integers, Subtraction]

Casterlow, Gilbert, Jr. The Effects of Calculator Instruction on the Knowledge, Skills, and Attitudes of Prospective Elementary Mathematics Teachers. The Pennsylvania State University, November 1980.

The purpose of this study was to determine the effects of three types of calculator instruction on preservice elementary teachers knowledge, calculator skills, and attitudes toward calculators and mathematics.

[Attitudes, Research, Teachers]

Chang, Lisa Li-Tze. An Examination into the Effects of Calculator-Assisted Instruction on the Mathematics Achievement and Attitude of Seventh and Eighth Grade Disadvantaged Students. (Cornell University, 1979.) Dissertation Abstracts International 40A: 1323-1324; September 1979.

Students (n = 126) in grades 7 and 8 were randomly divided into two groups. For 24 weeks, one group had calculators available during lessons, but not on tests or for taking home; the other group used only paper and pencil. No significant differences between groups were found on computation, concepts, or attitudes; a highly significant difference on problem solving favored the calculator group.

[Achievement, Attitudes, Junior high (grades 7-8), Remedial, Research]

Cheung, Y. L. Some Basic Questions About the Pocket Calculator. Hong Kong Science Teachers Journal 7: 40-49; December 1979.

Ways in which calculators can be used to teach mathematical ideas are presented, with specific examples. Selection of calculators as well as why, how, what, and when questions are discussed.

[Elementary, Roles, Secondary, Selection]

Clare, Brian W. Evaluation of Cation Hydrolysis Schemes with a Pocket Calculator. Journal of Chemical Education 56: 784-787; December 1979.

The use of two models of pocket calculators to solve problems arising in connection with ionic equilibria in solution is described.

[Chemistry, College, Programmable calculators]

Coburn, Terrence, G.; Reys, Robert E.; Schoen, Harold L.; Shumway, Richard J.; Wheatley, Grayson H.; and White, Arthur L. (CESM) Calculators in Elementary School Mathematics: Teacher Resource Packet. Xerox copy. 1980.

Activity sheets used in a workshop for elementary teachers comprise this resource packet.

[Activities, Elementary, Teachers, Worksheets]

Cohen, Martin P. and Fliess, Robert F. Minicalculators and Instructional Impact: A Teacher Survey. Pittsburgh: University of Pittsburgh, 1979. ERIC: ED 178 360.

Teacher attitudes, practices, and perceptions about school policies on calculator use were surveyed. Over 63% were strongly or mildly in favor of using calculators. The need for instructional materials using calculators was apparent.

[Attitudes, Research (survey), Secondary, Teachers]

Conner, Totsye J. Effects of Calculator Use in Elementary School Studied at P. K. Yonge Laboratory School. Gainesville: University of Florida, 1979.

Two classes each of kindergarten, second-grade, and fourth-grade students used calculators for 10 months. No significant difference in achievement was found in grades 2 and 4; the kindergarten group using calculators scored significantly higher than the non-calculator group.

[Elementary (grades k, 2, 4), Research]

Conner, Totsye J. An Investigation of the Use of Hand-Held Calculators by Students in Elementary School. Research Monograph #32. Gainesville: P. K. Yonge Laboratory School, University of Florida, Winter 1980.

This report on the study with students in kindergarten, grade 2, and grade 4 (see Conner, 1979) includes activities and survey instruments.

[Activities, Attitudes, Elementary (grades k, 2, 4), Research (experimental, survey)]

Creswell, John L. and Vaughn, Larry R. Hand-held Calculator Curriculum and Mathematical Achievement and Retention. Journal for Research

in Mathematics Education 10: 364-367; November 1979.

The ninth-grade Fundamentals of Mathematics students using calculators scored significantly higher on immediate tests than students not using them, but no significant retention effects were found.

[Basic mathematics, Research, Secondary (grade 9)]

Dickson, T. R. The Hand Calculator Handbook. Aptos, California: Alchemy Press, 1978.

Calculator algorithms for problems ranging from root finding of equations to trigonometry, surveying, navigation, and finances are included.

[Algebra, Algorithms, Finance, Naval applications, Post-secondary, Scientific calculators, Secondary, Trigonometry]

Doe, B. Calculator Can Sharpen Up Mental Maths. New York Times Education Supplement 3292: 7; August 4, 1978.

[Activities]

Donovan, George S. and Gimmestad, Beverly B. Trigonometry with Calculators. Boston: Prindle, Weber & Schmidt, 1980.

[Trigonometry]

Dorn, Carl and Councilman, Samuel. Some Properties of the Calculator Square-Root Function. Mathematics Teacher 73: 218-221; March 1980.

This exploration of the square-root can be used to introduce the notions of limit of a sequence, monotone function, and step function.

[Activities, College, Functions, Roots, Secondary, Scientific calculators]

Driscoll, Mark J. Calculators in the Classroom. In Research Within Reach: Elementary School Mathematics. St. Louis, Missouri: CEMREL, Inc., 1980.

Suggestions are made to elementary school teachers concerning how the calculator can be used creatively in the classroom.

[Elementary, Pros/cons, Recommendations, Research, Teachers]

Duea, Joan; Immerzeel, George; Ockenga, Earl; and Tarr, John. Problem Solving Using the Calculator. In Problem Solving in School Mathematics. 1980 NCTM Yearbook. Reston, Virginia: National Council of Teachers of Mathematics, 1980. Pp. 117-126.

Problems for use with calculators are provided; modifying textbook materials and developing a file are suggested.

[Elementary, Problem solving]

Duffett-Smith, P. Practical Astronomy with Your Calculator. London: Cambridge University Press, 1979.

[Astronomy]

DuRapau, V. J. and Bernard, John. From Games to Mathematical Concepts

Via the Hand-Held Programmable Calculator. International Journal of Mathematical Education in Science and Technology 10: 417-424; July-September 1979.

Three games involving functions and proof are presented, with the aim of stimulating creative thinking about the use of programmable calculators in the classroom.

[College, Functions, Games, Programmable calculators]

East, Philip and Moursund, David. Calculators and Computers in the Classroom. Eugene: University of Oregon, 1979. ERIC: ED 174 456.

This is a collection of informational materials and activities on the use of calculators and computers for instruction.

[Activities, Elementary, Secondary]

Eastman, Caroline M. Readers' Dialogue. Arithmetic Teacher 28: 45; September 1980.

The danger of sex-stereotyped electronic learning aids and their reinforcement of conventional prejudices is discussed.

[Marketing, Parents, Roles, Selection]

Edgell, John J., Jr. Decimals Take a New and Dominate Role in the Curriculum. 1979. ERIC: SE 027 609.

This speech discusses the difficulties that entering college freshman seem to have with mathematics, particularly with fractions. The use of calculators is suggested as one alternative in a success-oriented program.

[College, Decimals, Fractions]

Edsall, Karen Sue. The Administration of the Business Calculator Mathematics Curriculum in Relationship to Occupational Needs. (University of Nevada, Reno, 1979.) Dissertation Abstracts International 40A: 6085-6086; June 1980.

One major conclusion from this study is that businesses expect employees to have skills on adding and calculating machines before they are hired. Offering a required course in business calculators and business math for all students enrolled in the Business Division programs was recommended.

[Business education, Business math, College, Desk calculators, Recommendations, Research]

Egbert, William E. Personal Calculator Algorithms II: Trigonometric Functions. Didactic Programming 2: 7-10; Fall 1979.

The trigonometric function algorithm, scaling, vector rotation, pseudo-division, and pseudo-multiplication are discussed.

[Algorithms, College, Scientific calculators, Trigonometry]

Ehrlich, Amos. Programmable Calculator and Kinetics of Chemical Reactions. International Journal of Mathematical Education in Science

and Technology 11: 385-389; July-September 1980.

The use of simulation techniques using a programmable calculator in the study of chemical reactions are presented.

[Chemistry, Programmable calculators, Secondary]

Ehrlich, N. Activitiés préparatories à la formulation des notions de topologie (continuité, limite...). Bulletin de l'Association des Professeurs de Mathématiques 300: 509-514; 1975.

[Activities, College, Topology]

Eisner, Milton P. Curriculum Revisions for Technical Mathematics Courses. MATYC Journal 13: 179-181; Fall 1979.

The calculator is used to reinforce the concepts of zero and negative exponents, fractional exponents, and trigonometry without the use of tables or interpolation associated with them.

[College, Exponents, Secondary, Technical mathematics, Trigonometry]

Elich, Joseph and Elich, Carletta. Trigonometry Using Calculators. Reading, Massachusetts: Addison-Wesley, 1980.

This book is designed for a one-semester or one-quarter course in trigonometry, with calculator use integrated.

[Curriculum, Secondary, Trigonometry]

Engel. R. R. and Kunze, G. Scoring and Interpreting the MMPI with a Desktop Calculator. Behavior Research Methods and Instrumentation 11: 317; 1979.

[Desk calculators, Psychology (guidance), Testing]

Engelmeyer, William James. The Effectiveness of Hand-Held Calculators for the Remediation of Basic Multiplication Facts. (University of Maryland, 1978.) Dissertation Abstracts International 39A: 5381; March 1979.

Three groups of underachieving seventh graders (n = 193) participated. One group received 15 minutes extra of practice on multiplication facts with calculator feedback. A second group received 15 minutes extra group instruction on the facts, while a third group had only "normal" mathematics instruction. No significant difference in achievement was found between the two extra practice groups.

[Achievement, Attitudes, Drill, Junior high (grade 7), Low achievers, Multiplication, Remedial, Research]

Errichello, Robert. Calc Program Finds Inverse of an Involute. Machine Design 51: 80; March 1979.

A program for finding an angle from its involute (for gears) is given.

[Post-secondary, Programmable calculators, Programming, Technical mathematics]

Ercolano, Joseph. Fractional Computations on a Calculator. Mathematics

Teacher 72: 591-592; November 1979.

A procedure is presented for obtaining fractional results on a calculator.

[Fractions]

Etlinger, Leonard E. Hand-Held Calculators: Notes on Teacher Training. Illinois: Chicago State University, July 1980.

[Teachers]

Etlinger, Leonard E. Calculators: Elementary School Teacher Training for Hand-Held Calculators. Illinois Mathematics Teacher 31: 14-18; September 1980.

Four types of calculator knowledge needed by teachers are described: 1) special features, 2) issues relating to classroom use, 3) problem solving techniques, and 4) pedagogical role.

[Elementary, Pros/cons, Teachers]

Etlinger, Leonard E. and Ogletree, Earl J. Calculators in the Elementary School: A Survey of How and Why. Chicago: Chicago State University, (1980).

Information collected from NSF project participants with regard to how and why calculators should be used in the classroom is presented.

[Curriculum, Elementary, Teachers]

Etlinger, Leonard E.; Krull, Sarah; Sachs, Jerry; and Stolarz, Theodore J. The Calculator in the Classroom: Revolution or Revelation? Chicago: Chicago State University, (1980).

Advantages of the programmable calculator and recommendations for its use in the classroom are presented.

[Programmable calculators, Recommendations, Secondary, Teachers]

Ewbank, W. A. Results of a Survey Carried Out in October, 1979, of Children in Grades 1-6, Upland Elementary and Middle Schools and Matthews Elementary School (Eastbrook Community Schools, Indiana) Relating to the Ownership and Access to a Pocket Calculator. Xerox copy. November 1979.

A survey of 417 students indicated that percentage of calculator ownership or access ranged from 79% for first graders to 100% for sixth graders.

[Elementary, Research (survey)]

Fearnley-Sander, Desmond. Learning to Calculate and Learning Mathematics. International Journal of Mathematical Education in Science and Technology 11: 111-114; January-March 1980.

The solution to the equation $x^x = 3$ is approached by presenting the continuity of a function concept and the monotone convergence theorem in the forms of discussion and a calculator program.

[College, Functions, Programmable calculators, Programming, Secondary]

Festraets, C. et Noël, G. La précision des minicalculatrices. Mathématique et Pédagogie 11/12: 151-185; March-June 1977.

[Activities, Significant figures]

Fielker, David. Calculators: News Views Reviews. Mathematics Teaching 88: 2-5; September 1979.

An overview of several calculator activity publications are included along with opinions concerning the use of calculators in the schools and calculator selection and availability.

[Activities, Calculator logic, Elementary, Four-function calculators, Junior high, Pros/cons, References (selected), Roles, Secondary, Selection]

Fielker, David S. Editorial. Mathematics Teaching 89: 2-3; December 1979.

Media reactions to calculator use are described, with biased reporting evident.

[Pros/cons, Roles]

Fisher, Bill. Calculator Games: Combining Skills and Problem Solving. Arithmetic Teacher 27: 40-41; December 1979.

Several calculator games that involve computational practice are presented.

[Drill, Elementary, Four-function calculators, Games, Mixed operations]

Fiske, Edward B. They'll Learn Their Lessons This Time. Mainliner 95-99; September 1979.

[Pros/cons, Roles]

Fitzgerald, A. School Mathematics and Employment at 16+ with Particular Reference to Commerical Work. Mathematics in School 9: 26-31; June 1980.

Implications for the use of calculators in industry and in schools is briefly discussed.

[Pros/cons, Post-secondary]

Foerster, Paul A. Students Write Mathematics Tournament. Mathematics Teacher 73: 606-607; November 1980.

A calculator event in a high school mathematics tournament is illustrated.

[Secondary]

Free, John. Memo Calculators. Popular Science 216: 65; February 1980.

[Selection]

Free, John. Scientific Calculators. Programmable Calculators. Programmable Calculator Features Accessory Parts (Scientific Calculator Has

24-Digit Rolling Display). Popular Science 216: 125; February 1980.

[Programmable calculators, Scientific calculators, Selection]

Fugate, Barbara Riley. An Assessment of Attitudes, Self-Concept, and Mathematical Achievement Resulting from the Use of Minicalculators. (North Texas State University, 1978.) Dissertation Abstracts International 39A: 6531-6532; May 1979.

Three fourth-grade and three fifth-grade classes used calculators. Their (unexplicated) use did not improve achievement, attitude, or self-esteem.

[Achievement, Attitudes, Elementary (grades 4, 5), Research]

Gabel, E. E.; Sun, E.; and Sun, M. Calculator Timer. Physics Teacher 17: 611-612; December 1979.

Circuitry changes for converting a suitable calculator into a 0.1 sec timer by the use of a pulse generator are presented.

[Calculator logic, College, Physics, Secondary]

Gadrey, J. Les modeles logico-mathématiques dans la connaissance scientifique. Bulletin de l'Association des Professeurs de Mathématiques 302: 84-93; 1976.

[Logic]

Gallagher, James Joseph and Brandenburg, Richard (Eds.). Issues in Science and Mathematics Education: Selected Papers from the Conference Marking the Twentieth Anniversary of Michigan State University's Science and Mathematics Teaching Center. East Lansing: Michigan State University, Science and Mathematics Teaching Center, 1978. ERIC: ED 175 659.

Among the papers in this conference report is one on "Using Calculators in Mathematics Classrooms."

[College, Problem solving, Research, Science, Teachers]

Gerald, Curtis F. Interactive Computing with a Programmable Calculator; Student Experimentations in Numerical Methods. San Luis Obispo: California Polytechnic State University, June 1973. ERIC: ED 082 470.

Advantages of programmable calculators are listed and their potential use in mathematical experiments is mentioned.

[Attitudes, College, Differential equations, Problem solving, Programmable Calculators]

Glaeser, G. La didactique de l'analyse. Bulletin de l'Association des Professeurs de Mathématiques 302: 25-39; 1976.

[Activities]

Gold, M. Calculators in Freshman Chemistry - Alternative View. Journal of Chemical Education 56: 626; 1979.

The need to have students make mental computations led the author to

ban their use on examinations.

[Chemistry, College, Pros/cons, Testing]

Goodman, Terry A. and Bernard, John. Square Roots from Anywhere. Mathematics Teacher 73: 344-345; May 1979.

A novel approach to square roots, with which a programmable calculator can be used is presented.

[Activities, Programmable calculators, Roots, Secondary]

Green, D. R. and Lewis, J. Science with Pocket Calculators. New York: Crane and Russack, 1978.

[Science]

Gribaumont, A. Quelques méthodes numériques simples applicables à tout l'enseignement secondaire. Mathématique et Pédagogie 11/12: 81-99; March-June 1977.

[Numerical analysis]

Gribbin, J. and Gribbin, M. Calculators for Kids. New Scientist 82: 992; 1979.

[Activities]

Gwilt, S. Roy. Calc Programs Find Gear Geometry. Machine Design 51: 80-81; May 1979.

A series of programs provides a step-by-step procedure for sizing and positioning the drive gear.

[Post-secondary, Programmable calculators, Programming, Technical occupations]

Gyles, Colin. Analyze Complex Linear Networks with a Building-Block Calculator Program. Design Engineering 28: 191-197; April 1980.

[Engineering]

Haith, M. M. and Bertenth, B. Programmable Calculator as Timer, Storer, and Decision Maker in Psychology Experiments. Behavior Research Methods and Instrumentation 11: 349; 1979.

[Programmable calculators, Psychology, Research]

Harrois, Monin F. Les calculatrices de poche entrent à l'école.

Science et Vie 711: 110-112; 1976.

[Activities]

Hartman, Arlene. The Calculator Game Book. England: New English Library, 1979.

[Games]

Hatch, Gillian. Mathematics and Ice-Cream. Mathematics Teaching 89: 8-9; December 1979.

A child's work with combinations is presented, including one reaction to a calculator answer.

[Activities, Elementary, Multiplication]

Hector, Judith Ellen. The Effects of Calculator Versus Conventional Algorithms for Fractions on Community College Student Computation, Understanding, and Attitude Scores. (The University of Tennessee, 1978.) Dissertation Abstracts International 39A: 6605; May 1979.

Students in developmental arithmetic courses at two community colleges (n = 48, 33) were randomly assigned to three treatment groups: use of conventional algorithm, conventional algorithm plus calculators, or alternative algorithm involving conversion from fractions to decimals with calculators. Self-paced slide-tape-workbook presentations were used. No significant differences among groups was found for fractional computation or understanding, or attitude toward mathematics, but significant difference between pre- and posttest scores were found for each measure.

[Achievement, Attitudes, College, Fractions, Research]

Hector, Judith H. Using a Calculator to Teach Fraction Computation in Basic Arithmetic: Research and Observations. Knoxville, Tennessee, June 1979. ERIC: ED 171 520.

The relative effectiveness of three methods of teaching fraction computation in the context of the community college was investigated. The use of calculators was a special focus of the study. The three methods were conventional algorithms with no calculator, conventional algorithms with calculator, and alternative algorithms using decimal fractions with the calculator. The results indicate that learning calculator-based algorithms produced no difference in computational skill, understanding, attitudes, nor length of time to learn when compared with learning conventional algorithms.

[Algorithms, College, Fractions, Research]

Hedrén, Rolf. Hand Calculators and Maths in Primary School Prospectus 9: 332-335; 1979.

How the calculator can be used in elementary schools is discussed, with note of curricular development proposals in Sweden.

[Curriculum, Elementary, Pros/cons, Roles]

Hedrén, Rolf. Results (from Swedish Investigation). Paper presented

at ICME-IV meeting, Berkeley, August 10-16, 1980.

Students of both the experimental and control classes of form 4 were given pre- and posttests that each contained three parts: 1) mental arithmetic, 2) algorithms, and 3) diverse test items. The results show that the students really get use to translating the inherent problem structure of a problem from the real world into a mathematical formula by solving lots of realistic word problems with a hand calculator.

[Algorithms, Problem solving, Research]

Hirsch, Christian R. Activities from "Activities": An Annotated Bibliography. Mathematics Teacher 73: 46-50; January 1980.

Six articles on calculators are included in this biliography.

[Junior high, References (selected), Secondary]

Hirst, K. E. SMP Calculator Series. Zentralblatt fur Didaktik der Mathematik 12: 53-55; April 1980.

[Activities]

Hoffer, Shirley Ann (Ed.). Ratio, Proportion and Scaling. Mathematics Resource Project. Eugene: Oregon University, 1975. ERIC: ED 183 364.

A teaching emphasis section of the Mathematics Resource Project stresses ideas which may help to teach the topics of ratio, proportion, and scaling using calculators.

[Activities, Elementary, Games, Junior high, Ratio, Worksheets]

Hoffman, Ruth Irene. A Classroom Note on: Multiplication Education. MATYC Journal 14: 29; Winter 1980.

One activity useful to help students multiply with decimals is given.

[Activities, Decimals, Multiplication]

Hohenstein, Louis. How Calculators Can Put Your Accounts in Order. Administrative Management 40: 58-60; March 1979.

Use of a programmable calculator for figuring business account is described.

[Business, Desk calculators, Post-secondary, Programmable calculators]

Holdsworth, David P. High-Resolution Mass-Spectra Analysis with a Programmable Calculator. Journal of Chemical Education 57: 99: February 1980.

Instances in which a programmable calculator can be used to analyze mass-spectra data are presented.

[Chemistry, College, Programmable calculators]

Huff, Darrell. Calcu-Letter. Popular Science 214: 19; May 1979. 215: 31; July 1979. 215: 50; September 1979. 215: 66; November 1979. 216: 6; January 1980. 216: 20; March 1980. 216: 57; May

1980. 217: 8; July 1980. 217: 147; November 1980.

This bi-monthly column presents problems and suggestions about calculator use.

[Activities]

Huffman, Harry. Using Electronic Calculators in the Business Education Curriculum: A Research Review. Business Education World 59: 19-20, 25; September-October 1978.

[Business, Research (review)]

Hutton, Lucreda A. Calculators: Teacher's Attitudes and Children's Ability. Mathematics Teaching 90: 20-21; March 1980.

Comments on the project described by Vannatta and Hutton (1980) are presented.

[Attitudes, Elementary (grades 4-6), Research, Teachers]

Hyatt, Herman R. Teaching Arithemtic with Calculators. MATYC Journal 13: 203-204; Fall 1979.

Use of calculators to aid students in solving problems in a community college arithmetic course is briefly described.

[College (community), Four-function calculators, Remedial]

Ikeda, M. Electronic Calculators Tip Market in Japan's Favor. Business Japan 25: 19; 1980.

[Marketing]

Jackman, Lance E. Programmable Hand-Held Calculators in Biochemistry Laboratory Courses. Journal of College Science Teaching 9: 94-95; November 1979.

Ways programmable calculators are used in biochemistry courses are briefly described.

[Biochemistry, College, Programmable calculators]

Jagannath, S. Calculator Programs for the Hydrocarbon Processing Industries. Volume 1. Houston: Gulf Publishing Co., 1980.

[Industry, Science]

Johnson, David C. Figure and Chips. London: Chelsea College, January 20, 1979.

Included is a brief historical survey of calculators and computers in addition to implications for their use in school mathematics.

[Algorithms, Curriculum, Elementary, Functions]

Johnson, David C. Types of Calculators - Let's Use More Appropriate Descriptors. Mathematics in School 9: 19-20; September 1980.

Three types of logic -- 1) arithmetic, 2) algebraic, and 3) Reverse Polish Notation -- are explained and their importance in selecting

machines for school use is described.

[Four-function calculators, Scientific calculators, Selection]

Johnson, Kerry Adams. A Survey of Mathematics Programs, Materials and Methods in Schools for the Deaf. (Syracuse University, 1976.) Dissertation Abstracts International 38A: 2704; November 1977.

Little systematic effort has been devoted to developing programs for the deaf. Data were collected on a wide variety of practices.

[Curriculum, Elementary, Handicapped, Junior high, Research, Secondary]

Jones, Aubrey. Mathematical Astronomy with a Pocket Calculator. New York: Wiley, 1978.

[Astronomy]

Jurgensen, Marlinde. A Calculator-Assisted Fairy Tale. Mathematics Teacher 72: 683-684; December 1979.

[Activities, Secondary]

Kahan, William M. Personal Calculator Has Key to Solve Any Equation $f(x) = 0$. Didactic Programming 2: 36-39; Winter-Spring 1980.

How the SOLVE key on the HP-34C works is discussed.

[Calculator keys, College, Functions, Programmable calculators]

Kiehl, Charles F. and Harper, B. Ann. My Child the Math Whiz! Or Buy Your Child a Calculator. Education 100: 18-19; Fall 1979.

An overview of advantages and disadvantages of using calculators is provided.

[Elementary, Pros/cons, Secondary]

Kennedy, R. E. and Goodman, T. A. Know Your Calculator. School and Community 65: 14-15; January 1979.

[Selection]

Killingbeck, J. P. The Use of Pocket Electronic Calculators in Scientific Work. Contemporary Physics 17: 145-168; 1976.

[Physics, Post-secondary]

King, Ronald S. Concurrent Processing with Calculators. MATYC Journal 14: 13-16; Winter 1980.

Two types of problems that could be used to develop the idea of concurrent processing with calculators are presented.

[Algebra, Algorithms, College, Programmable calculators, Secondary]

Koop, Janice B. Calculators and the Community College Arithmetic Class. MATYC Journal 14: 113-120; Spring 1980.

The aims of remedial arithmetic courses for community college students

are considered. Reasons for using calculators in such a course are then provided.

[College (community), Pros/cons, Remedial, Roles]

Koup, J. R. Graphic Pharmacokinetic Simulation Program for the TI-59 Calculator. Journal of Pharmaceutical Education 44: 49; 1980.

[Pharmacy, Programmable calculators]

Krist, Betty J. Using Calculators in Eleventh Grade Mathematics - A Classroom Teacher's Report. Buffalo: State University of New York at Buffalo, 1978.

Comments from a teacher using the Math 11 programmable calculator materials developed by Rising et al. are given.

[Curriculum, Programmable calculators, Research, Secondary (grade 11)]

Lai, Theodore, Calculators in the College Classroom. MATYC Journal 13: 182-183; Fall 1979.

A list of references on the use of calculators in college classes is given.

[College, References (selected)]

Lamborn, Bud. TRIANG (Program for HP-41C). California: San Jose State University Computer Science Institute, June 1980.

An HP-41C program is outlined that solves for the unknown measurements of a triangle in three separate cases: 1) given SSS, 2) given SAS, and 3) given ASA.

[Activities, Geometry, Programmable calculators, Secondary, Trigonometry]

Lange, Bärbel and Meissner, Hartwig. Das Taschenrechnerspiel "Die Grosse Eins". Praxis der Mathematik 22: 308-311; October 1980.

A game with the goal of finding the number which would lead to 1 when used as the operator is presented.

[Activities, Elementary, Games]

Lange, Bärbel and Meissner, Hartwig. Das Taschenrechnerspiel "Die Grosse Null". Praxis der Mathematik 22: 245-248; August 1980.

A game in which students must ascertain the number which would lead to 0 when used as the operator is presented.

[Activities, Elementary, Games]

Lange, Bärbel and Meissner, Hartwig. Das Taschenrechnerspiel "Zielwerfen". Praxis der Mathematik 22: 174-176; June 1980.

A game using the constant is presented with a description of it being used by students and an explanation.

[Activities, Elementary, Games]

Lappan, Glenda and Winter, M. J. "It's What You Do First That Counts. . ." School Science and Mathematics 79: 409-414; May-June 1979.

Five calculator activities are described that are designed to explore ordered operations. Suggestions are given on mathematical objectives, strategies for solving, and possible extensions or follow-up activities.

[Activities, Mixed operations]

Leake, Lowell. Some Reflections on Teaching Mathematics for Elementary School Teachers. Arithmetic Teacher 28: 42-44; November 1980.

The role of calculators in a mathematics course for preservice elementary teachers is described.

[Course description, Four-function calculators, Roles, Teachers]

Lenty, R. Calculator Center. Indiana Education 68: 16; September 1979.

Activities

Leutzinger, Larry P. and Nelson, Glenn. Let's Do It With Powers of Ten. Arithmetic Teacher 27: 8-13; February 1980.

Techniques for developing ability to multiply and divide by powers of ten are described, with the calculator suggested as one of several tools to use.

[Activities, Division, Multiplication]

Lothe, Herbert and Muller, Kurt Peter. Taschenrechner. Stuttgart: Teubner Stuttgart, 1979.

[Selection]

Lund, Chuck and Smart, Margaret A. Focus on Calculator Math. Hayward, California: Activity Resources Company, Inc., 1979.

Single-page exercises involving place value, rounding, and patterns are provided.

[Activities, Consumer applications, Decimals, Division, Estimation, Fractions, Pattern searches]

Maor, Eli. Polynomial Evaluation on the Calculator: Two Lessons. Didactic Programming 2: 11-13; Fall 1979.

The polynomial function is explored using a calculator.

[Algebra, College, Scientific calculators, Secondary]

Maor, Eli. A Summer Course with the TI-57 Programmable Calculator. Mathematics Teacher 73: 99-106; February 1980.

A six-week course for students aged 8-11 and 12-15 is outlined, and how some topics were explored is described.

[Course description, Elementary (ages 8-11), Gifted (enrichment), Junior high (ages 12-15), Programmable calculators]

Maor, Eli. Some Uses of the Exchange Key on a Calculator. Mathematics Teacher 73: 213-217; March 1980.

Several topics with which the exchange key can be used are described: Fibonacci numbers, square roots, and geometric series.

[Algorithms, Calculator keys, Scientific calculators, Secondary, Selection (features)]

May, Lola June. One Point of View: Change and Changelessness. Arithmetic Teacher 27: 4-5, 37,; May 1980.

The impact of the calculator on the elementary and junior high mathematics curriculum is discussed and recommendations for its use are presented.

[Elementary, Junior high, Recommendations, Roles]

Mayer, R. E. and Bayman, P. Analysis of Students' Intitutions About the Operation of Electronic Calculators. Santa Barbara: Department of Psychology, Series in Learning and Cognition, Report No. 80-4, 1980.

[Attitudes, Research]

McCarty, George. Display Calculators Bring a New Dimension to Teaching. Audiovisual Instruction 24: 20-21; September 1979.

A method of using a display calculator for communicating algorithms in classroom mathematics instruction is described.

[Algorithms, Classroom management, College, Roles, Secondary]

McCarty, George. Calculator-Demonstrated Math Instruction. Two-Year College Mathematics Journal 11: 42-48; January 1980.

A demonstration for a calculus class on Newton's method is described, with general principles for planning demonstrations noted. A list of additional topics for demonstrations is also given.

[Activities, Calculus, College, Teachers (planning)]

McCune, E. D.; Dean, R. G.; and Clark, W. D. Calculators to Motivate Infinite Composition of Functions. Two-Year College Mathematics Journal 11: 189-195; June 1980.

Several examples are presented for using a calculator to motivate the concept of infinite composition of functions, including continued square roots, continued fractions, and infinite products.

[Calculus, College, Functions, Scientific calculators, Secondary]

McDermot, J. Personal Scientific Calculators. EDN Magazine - Electrical Design News 24: 97; 1979.

[Scientific calculators, Selection]

McLeod, Douglas B. and Adams, Verna M. Aptitude-Treatment Interaction in Mathematics Instruction Using Expository and Discovery Methods. Journal for Research in Mathematics Education 11: 225-234; May 1980. (See also ERIC: ED 170 113).

Students in three mathematics classes for prospective elementary teachers were assessed on two aptitudes, field independence and general reasoning, and randomly assigned to either an expository (n = 24) or a discovery (n = 23) treatment. The instruction involved errors in measurement and calculations with approximate data. A significant interaction was found with general reasoning on the retention test, as predicted. There were no interactions with field independence.

[College, Elementary, Research, Teachers (preservice)]

McNemar, Robert; Huber, James; Gilbreath, Catherine; and Myers, Alberta. Columbus Calculator Project. Final Report, ESEA Title IV-C. Columbus, Ohio: Columbus Public School District, 1979.

This teacher training manual includes instructions on operating a calculator and implementing calculators in the classroom.

Calculator keys, Classroom management, Teachers

Meiring, Steven P. A Basic Mathematics Goal, 2: A Resource for Problem Solving. Columbus, Ohio: Department of Education, 1980.

The role of calculators in problem solving is explained and suggestions for their proper use are outlined.

[Activities, Elementary, Junior high, Problem solving, Teachers]

Meissner, Hartwig. The Effects of the Use of Calculators on the Initial Development and Acquisition of Mathematical Concepts and Skills. Paper presented at the ICME-IV meeting in Berkeley, August 16-17, 1980.

Some uses of the calculator in the semantical and syntactical modes are outlined.

[Basic mathematics, Elementary, Numerical analysis, Research]

Meissner, Hartwig. Number Sense and Computational Skills. Paper presented at the ICME-IV meeting in Berkeley, August 16-17, 1980.

The possible impact of the calculator on abilities and arithmetic skills are discussed along with ideas on how the calculator might be used to teach semantical and syntactical number sense.

[Algorithms, Basic mathematics, Elementary, Numerical analysis, Pros/cons, Research]

Meissner, Hartwig and Wollring, B. Ergebnisse einer Schüler- und Lehrerbefragung zu Taschenrechnern im Mathematikunterricht, 1978.

[Attitudes]

Merchant. Ronald. A New Approach to Teaching Business Oriented Students. Community College Review 7: 36-39; Spring 1980.

A basic business mathematics course that involves electronic desk calculators is described.

[Business mathematics, Course description, Desk calculators, Postsecondary]

Merzbach, Uta C. George-Sheutz and the First Printing Calculator. Menlo Park, California: Addison-Wesley, 1977.

[History]

Meyer, Phillis I. When You Use a Calculator You Have to Think! Arithmetic Teacher 27: 18-21; January 1980.

Ways in which a fourth-grade class used calculators are described.

[Activities, Attitudes, Elementary (grade 4)]

Michel, F. Exemples d'utilisation du calculateur programmable dans des domaines non classiques. Mathématique et Pédagogie 11/12: 187-213; March-June 1977.

[Numerical analysis, Programmable calculators]

Michelow, Jaime and Vogeli, Bruce. College Mathematics and Calculators. Journal of CUNY Mathematical Discussion Group 5: 43-46; Fall 1977.

Discussion of the effects of calculators in college mathematics is presented. The effects are categorized in three groups: effects upon content, effects upon process, and effects upon emphasis.

[College, Curriculum, Roles]

Miel, George. Calculator Calculus and Roundoff Errors. American Mathematical Monthly 87: 243-252; April 1980.

An "elementary analysis" of roundoff errors in calculator demonstrations of the limit process is presented, with numerical illustrations that can easily be shown in the classroom.

[Calculus, College, Numerical analysis]

Miles, Marion Moss. A Study of the Interrelationship of the Hand-Held Calculator, Achievement in Mathematical Computation and Problem-Solving, and Attitude Toward Mathematics of Eighth Grade Students. (The University of Mississippi, 1980.) Dissertation Abstracts International 41A: 931; September 1980.

Some conclusions of this calculator study are: 1) students using calculators were able to solve as many computational problems as those using paper and pencil, 2) girls who have experienced using calculators benefit more than boys who used calculators, 3) the use of calculators does not affect the computational or problem-solving ability of students, and 4) low ability groups do not benefit from the use of calculators as much as medium ability and high ability groups.

[Basic mathematics, Junior high, Problem solving, Pros/cons, Recommendations, Research]

Mims, F. M. Modifying Calculators. Popular Electronics: 16: 85-87; December 1979.

[Building]

Mitchell, Charles E. Problem Solving & RPN Logic. Computing Teacher 6: 35-36; May 1979.

A calculator using RPN logic is integrated into instruction on problem solving; specific illustrations are included.

[Calculator logic, Junior high (grade 7), Problem solving]

Mitchell, Charles E. and Blume, Glendon W. An Introduction to Calculator Logic Systems. Mathematics Teacher 73: 494-499; October 1980.

Hand-held calculator logic systems found on the market are introduced and the advantages and disadvantages of each are explored.

[Calculator logic, Selection, Teachers]

Moser, James M. The Effect of Calculator Supplemented Instruction Upon the Arithmetic Achievement of Second and Third Graders. Technical Report No. 502. Madison: Wisconsin Research and Developmental Center for Individualized Schooling, September 1979. ERIC: ED 180 764.

Four classes in grades 2 and 3 used calculators with the on-going instructional program from October to mid-May, while four classes did not have access to calculators in their mathematics lessons. Statistically significant differences favored the second-grade calculator group only on subtraction and the third-grade group only on place value and division; no other differences were significant.

[Addition, Division, Elementary (grades 2, 3), Four-function calculators, Multiplication, Place value, Research, Subtraction]

Moursund, David. It's OK to Use Calculators (A Message to Elementary School Teachers). The Computing Teacher 6: 3-5; May 1979.

A clear rationale, encouraging teachers to accept and explore uses of calculators in elementary school classrooms, is presented.

[Elementary, Roles, Teachers]

Moursund, David. Calculators and Elementary Education Part 2: Using a Calculator. Computing Teacher 7: 18-23; October-November 1979.

The second chapter of the book, Calculator and Elementary Education, is presented. Calculator characteristics are described with examples to illustrate uses.

[Activities, Calculator keys, Calculator logic, Elementary, Four-function calculators, Selection]

Moursund, David. Calculators and Elementary Education Part 3: Problem Solving. Computing Teacher 7: 29-36; December 1979-January 1980.

This third chapter of Calculators and Elementary Education presents problems and discusses ways the calculator is useful in problem solving.

[Activities, Elementary]

Moursund, David. Calculators and Elementary Education Part 4: Func-

tions and Formulas. Computing Teacher 7: 20-26; February-March 1980.

The fourth chapter of Calculators and Elementary Education is presented, with a focus on using calculators to analyze functions and algebraic formulas.

[Activities, Elementary, Four-function calculators, Functions]

Moursund, David. Calculators and Elementary Education Part 5: Calculator Memory. Computing Teacher 7: 42-50; April-May 1980.

The use of the memory of a four-function calculator is detailed. The goal is to understand how the contents of various memory locations change as a calculation is keyed in and executed.

[Calculator memory, Elementary (teachers), Four-function calculators]

Moursund, David. Calculators and Elementary Education Part 6: Applications. Computing Teacher 7: 55-60; June-July 1980.

Samples of applications of calculators that may be suited for the elementary school are listed. The applications involve using the calculator to form words, giving insight into machines, deciding when to use mental arithmetic, and playing games.

[Calculator keys, Elementary, Estimation, Games, Problem solving]

Moursund, David. Elementary School Computer-Related Activities. Computing Teacher 7: 28-31; April-May 1980.

Along with a variety of computer activities, three calculator activities are described.

[Activities, Elementary, Four-function calculators]

Musser, Gary L. Using Programmable Calculators to ENLARGE the Problem Solving World of 10-12 Year Olds. Computing Teacher 8: 38-41; September 1980.

Suggestions are made for using programming as a vehicle for teaching problem solving skills to fourth and fifth graders.

[Activities, Elementary, Gifted, Problem solving, Programmable calculators]

Nachtergaele, J. La calculatrice, instrument de travail pour l'étude des équations, inéquations et fonctions. Mathématique et Pédagogie 11/12: 143-150; March-June 1977.

[Activities, Equations, Functions]

Noël, Guy. Les "erreurs" des TI58 et 59. Mathématique et Pédagogie 19: 41-42; 1978.

[Selection]

Noël, Guy. Minicalculatrices et approximation. Paper from CIEM of Luxemborg, 1978.

[Estimation]

Noël, Guy (Ed.). La Minicalculatrice Dans Les Classes. A set of papers from Seminaire de Didactique des Mathematiques. Mons, Belgium: University of Mons, 1978-1979.

[Activities]

Noël, Guy. Résoudre des problèmes linéaires. Mathématique et Pédagogie 21: 5-18; 1979.

[Numerical analysis]

Noël, Guy. Toujours les erreurs d'arrondi. Mathématique et Pédagogie @ 1979.

[Estimation]

Noël, Yolande. Calculatrice et intégration. Mathématique et Pédagogie 15: 37-45; 1978.

[Numerical analysis]

Noël, Yolande. Calculatrices programmable au secours de l'arithmétique. Mathématique et Pédagogie 22: 33-35; 1979.

[Programmable calculators]

Noone, Jean Abbott. Effects of the Use of Hand-Held Calculators on Mathematics Achievement and Attitude Toward Mathematics of Seventh Grade Students. (University of Virginia, 1979.) Dissertation Abstracts International 40A: 3849; January 1980.

Four seventh-grade classes were randomly assigned to groups using or not using calculators for two months. No significant differences were found between groups on measures of achievement and attitudes.

[Achievement, Attitudes, Junior high (grade 7), Low achievers, Research]

Ogletree, Earl J. and Etlinger, Leonard. Should Hand-Held Calculators be Used in the Elementary School: A Survey. Chicago: Chicago State University, February 1980.

Teacher reactions to how the calculator might be used in schools were obtained. Generally, it was felt that they should not be used until basic facts are learned, although 96% recognized that children can learn mathematics from using calculators.

[Elementary, Research (survey), Roles, Secondary]

Osborne, Alan R. et al. PRiorities in School Mathematics. Final Report from the PRISM Project and Appendices A and B. Appendices C and D. Reston, Virginia: National Council of Teachers of Mathematics, March 1980. ERIC: ED 184 891 and ED 184 892.

[Research (survey)]

Paasonen, Johannes. The Electronic Hand Calculator in Finnish Comprehensive Mathematics Teaching. Paper presented at the ICME-IV meeting

in Berkeley, August 10-16, 1980.

In an experiment featuring a non-equivalent control group design, calculators were used by the pupils of two fourth-grade classes (age 11-12). The calculator was used with a standard curriculum and textbooks. Results on the understanding, application, and attitude tests indicated a significant ($p < .05$) difference in favor of the experimental group.

[Attitudes, Low achievers, Research]

Packer, Claude Montgomery. The Effects of Hand Calculators on Attitude, Achievement and Retention of Students in College Level Mathematics. (Cornell University, 1979.) Dissertation Abstracts International 40A: 3095; December 1979.

Sixty-eight pairs of elementary preservice teachers in Jamaica were randomly assigned to ability groups using or not using calculators for six weeks. No significant differences were found in achievement, retention, problem-solving ability, or attitude.

[Achievement, Attitudes, College, Problem solving, Research]

Pasework, William Robert. Electronic Display Calculator Course. Cincinnati, Ohio: South West Publishers, 1975.

[Activities]

Pearce, B. G. The Use of Electronic Calculators: Mistakes and Problems. Unpublished thesis, Loughborough University of Technology, 1977.

[Activities, Research]

Peckham, Herbert D. and Weir, Maurice D. Calculator Calculus for the TI-59 Programmable Calculator. Monterey, California: Naval Postgraduate School, Department of Mathematics, 1978.

Master programs which enhance the student's understanding of calculus, differential equations, approximations, and calculator techniques are described.

[Calculus, College, Programmable calculators]

Pedersen, Dean Anthony. The Effect of the Calculator on the Elementary Mathematics Student. (University of Northern Colorado, 1978.) Dissertation Abstracts International 39A: 4794; February 1979.

Three-hundred-nine students in grades 2, 3, and 6 were assigned to groups using or not using calculators for eight months. No significant difference in achievement was found.

[Achievement, Elementary (grades 2, 3, 6), Research]

Perry, Robert. How to Choose - and Use - a Programmable Calculator. Popular Mechanics 152: 98-99; September 1979.

[Programmable calculators, Selection]

Peterson, Gregory K. Cube Roots on a Calculator -- Some More Thoughts. Mathematics Teacher 72: 448-449; September 1979.

An alternative method for determining cube roots is presented.

[Roots]

Plancke-Schuyten, G. The Status of Calculator in Primary and Secondary Education. In Mathematical Education in Beligum (G. Noel, editor). Brussels: Sous-Commission belge de la C.I.E.M., 1980. pp. 59-75.

The status of calculator use in Belgium in terms of curricular implications, research activities, instructional practices, teacher in-service, and calculator selection is summarized.

[Curriculum, Elementary, Research, Secondary, Teachers]

Plunkett, Stuart. Decomposition and All That Rot. Mathematics in School 9: 2-5; March 1980.

The need for written and mental algorithms is discussed, with a proposal for the type and extent of calculations to be taught given the calculator.

[Algorithms, Elementary, Recommendations]

Rabaey, Herman. Principles on the Use of the Calculator in Secondary Education. Formulated at the Conference for Mathematics Teachers. Kortrijk, Belgium, October 27, 1979.

[Roles, Secondary]

Ransome, W. Letters. Mathematics Teaching 90: 4-5; March 1980.

This letter discusses the point that calculators are not a panacea; students must still frame the question and interpret the answer.

[Pros/cons, Roles]

Reiling, Mary J. and Boardman, Gerald R. The Hand-Held Calculator Is Here: Where Are the Policy Guidelines? Elementary School Journal 79: 293-296; May 1979.

A review of articles on the use of calculators is given, with an emphasis on research conclusions. The need for policy guidelines is discussed, and eight suggested guidelines are listed.

[Recommendations, Research (review), Status report]

Reys, Robert E. Calculators in the Elementary Classroom: How Can We Go Wrong! Arithmetic Teacher 28: 38-40; November 1980. See also: (same title) paper presented at the AERA meeting, San Francisco, April 1979.

Ten misuses of calculators in the schools are discussed and suggestions are made for improvement.

[Curriculum, Recommendations]

Reys, Robert E.; Bestgen, Barbara J.; Rybolt, James F.; and Wyatt, J. Wendell. Hand Calculators: What's Happening in Schools Today?

Arithmetic Teacher 27: 38-43; February 1980.

Results from interviews with 194 elementary and secondary teachers in Missouri are presented. Eighty-four percent said that calculators should be available to children in school. Eighty percent felt that children should master the four operations before using calculators. Almost two-thirds indicated the need for in-service training. Additional findings are also reported.

[Attitudes, Elementary, Research (survey), Secondary, Teachers]

Roberts, Dennis M. The Impact of Electronic Calculators on Educational Performance. Review of Educational Research 50: 71-98; Spring 1980.

Thirty-four experimental studies on calculator use are critiqued. Results showed support for the computational benefits of calculator use, but support for conceptual benefits was minimal. Attitude changes were immediate and task-specific. Defective research designs were noted.

[Achievement, Attitudes, Research (review)]

Roberts, George D. and Roberts, G. Gilbert. A Method for Measuring a Plane Angle. School Shop 38: 36-37; November 1978.

[Geometry, Industrial education, Secondary]

Roesch, Carl J. Reflecting the New Computation in Eleventh Year Mathematics. Final Report. Buffalo: State University of New York at Buffalo, 1978.

This report presents comments and data from a teacher using the Math 11 programmable calculator materials developed by Rising et al.

[Curriculum, Programmable calculators, Research, Secondary (grade 11)]

Rogoff, Mortimer. Calculator Navigation. Chicago, Illinois: Norton, 1980.

[Navigation]

Romanovskis, Tomass. Elektroniskie Kabatas Skaitļotāji. USSR: Izdevniecība Zinātne, 1980.

This Russian publication presents numerous activities showing how to use the calculator for everyday calculations. Various types of calculators are also discussed.

[Four-function calculators, Programmable calculators, Scientific calculators, Selection]

Rosier, Malcolm. Changes in Secondary School Mathematics in Australia: 1964-1978. Australia: The Australian Council for Educational Research Limited, November 1980.

This book contains a section on the use of calculators and the effects on achievement.

[Achievement, Curriculum, Recommendations, Research, Testing]

Rosser, J. Barkley and DeBoor, Carl. Pocket Calculator Supplement for Calculus. Reading, Massachusetts: Addison-Wesley, 1979.

[Calculus, College]

Rothery, Andrew. At Home with Your Calculator. London, England: Harrap Books, 1980.

This book can be used in schools to help the weaker student solve day to day mathematical problems.

[Activities, Consumer activities, Junior high, Low achievers, Secondary]

Rothery, Andrew. Calculator Maths. London, England: Harrap Books, 1980.

Calculator problem-solving activities for the secondary school student are presented.

[Activities, Basic mathematics, Games, Junior high, Problem solving, Secondary]

Rouse, William. The Power Box: A Solution to Calculator Logistics. Mathematics Teacher 72: 516-517; October 1979.

A way of packing and carrying AC-powered calculators is described.

[Classroom management]

Rynone, William John, Jr. An Investigation of the Impact of Specialized Training in the Use of the Hand-Held Calculator on Selected Engineering Technology Students. Unpublished doctoral dissertation, New York University, 1980.

Eighty-one freshmen enrolled in engineering technology programs were assigned to groups using or not using calculators. The experimental group was given 10-15 hours of instruction to provide requisite skills using calculators. For 13 of 15 practical engineering problems, a greater percentage of the experimental subjects were correct; thus, the calculator group performed significantly better than the non-calculator group.

[Achievement, College, Engineering, Problem solving, Research]

Sackson, Sid. Calculate: Use Your Calculators and Your Wits in Six Challenging Pencil Games for Two or More Players. New York: Pantheon Books, 1979.

Activities for several age levels are included in this book.

[Activities, Games]

Salsberg, A. Decade of the Hand-Held Calculator. Popular Electronics 16: 4; December 1979.

[Status report]

Salt, Brian G. D. Programmes for Animation: A Handbook for Animation Technicians: 57 Programmes in Animation for a Programmable Calcu-

lator. Oxford, England: Pergamon Press, 1978.

[Programmable calculators]

Schussheim, Joan Yares. Calculator Talk. Teacher 95: 85-86; March 1978.

The calculator was used in a computational activity to spell words.

[Activities, Elementary, Four-function calculators]

Selkirk, Keith. Liquid Crystal Displays: A Motivator for Some Simple Investigations. Mathematics in School 9: 14-15; March 1980.

Some investigations with the format of each digit in the display on a LCD calculator or watch are suggested.

[Activities, Selection]

Shields, Joseph J. Mini-Calculators and Problem Solving. School Science and Mathematics 80: 211-217; March 1980.

How the calculator can facilitate the development of problem-solving skills is discussed.

[Elementary, Problem solving]

Shimada, Shigeru. International Survey of the Use of Calculators in School Mathematics. Journal of Japan Society of Mathematical Education 257-263; 1980.

The international review by Suydam (1980) is summarized in this Japanese article.

[International, Reviews, Status reports]

Shore, David J. Calculators/General Mathematics. In Reader Reflections. Mathematics Teacher 73: 408; September 1980.

A successful teaching unit using the TI-30 and a Philadelphia School District guide is described.

[Consumer applications, Secondary, Scientific calculators, Units]

Shuler, Carla. Using Calculators to Make Geometry Plane. Ohio Journal of School Mathematics 3: 21-25; November 1979.

Ways in which calculators were used in a plane geometry course are listed.

[Activities, Geometry, Secondary]

Shult, Douglas L. Calculator Assisted Problem Solving Part 1: Rationale and Research. Computing Teacher 7: 4-8; April-May 1980.

Following discussion of the case for using calculators in school and presentation of recommendations for their use in problem solving, studies of the effect of their use with problem solving are summarized.

[Elementary, Pros/cons, Recommendations, Research, Secondary]

Shult, Douglas L. Calculator Assisted Problem Solving Part 2: Classroom Applications. Computing Teacher 7: 40-47; June-July 1980.

The calculator activities and applications presented in this article are designed to build analytical as well as technical problem-solving skills. Calculator games and puzzles, problem solving in the "real world", and basic operations are given special attention.

[Activities, Basic mathematics, Calculator keys, Games, Problem solving]

Shult, Douglas Lee. The Effect of the Hand-Held Calculator on Arithmetic Problem-Solving Abilities of Sixth-Grade Students. (University of Oregon, 1979.) Dissertation Abstracts International 40A: 6179-6180; June 1980.

The purposes of this study were to determine the effects of hand-held calculator usage on the problem-solving effectiveness of average sixth-grade mathematics students and the investigate differences in problem-solving processes between calculator users and nonusers. The results indicated that the hand-held calculator neither positively nor negatively influences the problem-solving effectiveness of average sixth-grade students.

[Elementary, Problem solving, Research]

Shulte, Albert P. Four Essential Forward Steps. Arithmetic Teacher 28: 2; November 1980.

The role of the calculator in computation instruction is explained.

[Basic mathematics, Curriculum, Elementary, Junior high, Recommendations]

Sigurdson, Orville et al. Area. Topical Module for Use in a Mathematics Laboratory Setting. Denver, Colorado: Regional Center for Pre-College Mathematics, 1973. ERIC: ED 183 405.

An enrichment activity is included that requires the aid of a programmable calculator.

[Activities, Geometry, Junior high, Programmable calculators]

Slesnick, Twila. The Calculator Has Failed Mathematics: A Look Back at Calculators in Education. Computing Teacher 8: 15-17; September 1980.

The current use of calculators in the elementary schools is evaluated and myths concerning their place in the curriculum are discussed.

[Algorithms, Curriculum, Elementary, Evaluation, Pros/cons]

Sloyer, C. W. Geometric Growth and the Hand-Held Calculator. Mathematics Teacher 73: 610-611, 617; November 1980.

A payment scheme activity is presented that uses the calculator as an investigative tool for generating the sum of a finite geometric series with n terms.

[Activities, Calculus, Consumer applications, Proofs, Secondary]

Smith, J. M. Advanced Analysis with the Sharp 5100 Scientific Calculator. New York: Wiley, 1979.

[Numerical analysis, Scientific calculators]

Smith, J. M. Pocket Calculator. Chemical Engineering 4: 81-92; 1976.

[Science, Selection]

Snider, Arthur D. The Calculator Evaluation of Transcendental Functions. Didactic Programming 2: 33-35; Winter-Spring 1980.

How the pseudo-multiplication and pseudo-division techniques used in calculators to evaluate transcendental functions are based on elementary identities is shown.

[Algebra, Functions, Logarithms, Scientific calculators, Secondary, Trigonometry]

Sovchik, Robert J. Cal the Calculator Can Help Parents Become Involved. Arithmetic Teacher 27: 50-51; March 1980.

Instructions for making a milk carton calculator for practicing basic skills are outlined.

[Basic mathematics, Elementary, Parents]

Standifer, Charles Edward. Achievement and Attitude of Third-Grade Students Using Two Types of Calculators. (Northeast Louisiana University, 1978.) Dissertation Abstracts International 39A: 5314; March 1978.

Nine third-grade classes were randomly assigned to use calculators 8-10 minutes per day for checking and other activities, to use programmed feedback "calculators" 8-10 minutes per day for drill, or to have a traditional paper-pencil approach for 16 weeks. Significant differences favored the calculator group over both other groups on acquisition and retention computation measures, and the programmed-feedback group over the control group on acquisition. No differences for concepts or attitude were found.

[Achievement, Attitudes, Checking, Drill, Elementary (grade 3), Four-function calculators, Preprogrammed devices, Research]

Stewart, Ada. Office Occupations--Clerical--Calculators. Kit No. 75. (Instructor's Manual and Student Learning Activity Guide.) 1978. ERIC: ED 169 364.

[Business education]

Stolarz, Theodore J. The Programmable Calculator in the Classroom. Chicago: Chicago State University, (1980).

Teaching the skills necessary to develop algorithms for programmable calculators is discussed.

[Algorithms, College, Programmable calculators, Secondary, Teachers]

Stoner, George. Program for HP-25 Programmable Calculator. Letter, 25 October 1980.

A program for a Hewlett-Packard HP-25 Programmable Scientific Calculator is presented that will display successive members of various series such as increasing powers of a number and Fibonacci numbers.

[Pattern searches, Programmable calculators, Programming, Secondary, Scientific calculators]

Stover, Donald W. Where do These Numbers Come From? Mathematics Teacher 73: 288-294; April 1980.

How programmable calculators and computers help students gain insight into techniques for finding square roots and calculating functions are detailed.

[Functions, Logarithms, Programmable calculators, Roots, Trigonometry]

Sturgess, David. What Should They Know at Sixteen? Mathematics Teacher 85: 22-23; December 1978.

This article specifies the calculator skills that are basic skills.

[Curriculum, Elementary, Junior high, Secondary]

Suydam, Marilyn N. Reference Bulletins from the Calculator Information Center. Columbus, Ohio: Calculator Information Center, 1979. ERIC: ED 167 426.

Twenty-four reference bulletins compiled prior to June 1979 are included.

[References]

Suydam, Marilyn N. Calculators: A Categorized Compilation of References. Columbus, Ohio: ERIC/SMEAC, June 1979. ERIC: ED 171 152.

References on calculators published prior to June 1979 are listed, with categories indexed.

[References]

Suydam, Marilyn N. (Ed.). State of the Art Reviews on the Use of Calculators. Columbus, Ohio: Calculator Information Center, 1979. ERIC: ED 171 573.

Status reports from April 1978 and May 1979 are included.

[Status report]

Suydam, Marilyn N. (Ed.). Information Bulletins from the Calculator Information Center. Columbus, Ohio: Calculator Information Center, 1979. ERIC: ED 171 574.

Seven information bulletins prepared prior to June 1979 are included.

[Activities, Workshops]

Suydam, Marilyn N. (Ed.). Investigations with Calculators: Abstracts and Critical Analyses of Research. Supplement. Columbus, Ohio: Calculator Information Center, 1979. ERIC: ED 171 585.

Research reports on calculator use are abstracted and critiqued by mathematics educators.

[Research (review), References]

Suydam, Marilyn N. (Ed.). International Calculator Review. Columbus, Ohio: ERIC/SMEAC, March 1980.

Included are reports from 16 countries on calculator uses in schools, plus a synthesis, a report from a Working Group for the Second International Mathematics Study, and a bibliography.

[Achievement, Activities, Attitudes, Curriculum, Pros/cons, Recommendations, References (selected), Roles, Status report]

Szetela, Walter. Calculators and the Teaching of Ratios in Grade 7. Journal for Research in Mathematics Education 11: 67-70; January 1980.

Students in two seventh-grade classes were randomly assigned to instruction on ratios using or not using calculators for three weeks. No significant differences in achievement or attitude were found between groups on paper-and-pencil tests.

[Achievement, Attitudes, Junior high (grade 7), Ratios, Research]

Tobias, Sheila. Beyond Math Anxiety, a World is Waiting. Graduate Woman 74: 10-11, 46-48; January-February 1980.

Calculators are briefly discussed in this article on mathematical anxiety of women.

[Attitudes, Problem solving]

Toole, Betty Ann Zelig. Evaluation of the Effectiveness of Calculator Assisted Curriculum and Instruction in Ninth Grade General Mathematics Classes. (University of California, Berkeley, 1979.) Dissertation Abstracts International 40A: 3852-3853; January 1980.

Six ninth-grade general mathematics classes used a calculator-assisted supplementary curriculum during one-fifth of instructional time, while the control group used the regular curriculum. No significant difference was found between groups except for high-scoring students who used the calculator curriculum.

[Curriculum, General mathematics, Junior high (grade 9), Research]

Toth, Frank S., Jr. Calculator Experiments for Junior High. Computing Teacher 6: 37-38; May 1979.

An experiment on prime factorization is presented; it could be used as a basic lesson plan with seventh graders.

[Activities, Junior high (grade 7), Units]

Toth, Frank S., Jr. A Calculator-Numer Base Activity. Computing Teacher 7: 33-34; June-July 1980.

A procedure is illustrated which changes a numeral in base 8 or base 16 to a base 10 numeral.

[Activities, Algorithms, Calculator memory]

Townsend, Gloria Childress. The Effect of Programmable Calculator Use on Probability Estimation Achievement and Attitude Toward Estimation of Students in Second Year Algebra. (Indiana University, 1979.) Dissertation Abstracts International 40A: 1936; October 1979.

Three second-year algebra classes used 10 days to investigate a series of probability exercises. The student-programming group estimated answers and then wrote their own programs to verify their estimates. The teacher-programming section used the teacher's programs to verify estimates. The control group received the results of a hypothetical experiment to verify estimates. Some difference in estimation achievement was noted for the student-programming group; attitudes were significantly better than in the control group.

[Achievement, Algebra, Attitudes, Estimation, Probability, Programmable calculators, Research, Secondary (grade 11)]

Trede, Larry D. Using a Programmable Calculator in Vo-Ag. Agricultural Education 52: 17-18; April 1980.

The capabilities of the programmable calculator and its possible uses by a vocational agriculture teacher are discussed.

[Curriculum, Programmable calculators, Secondary, Teachers, Vocational agriculture]

Turck, J. A. Origin of Modern Calculating Machines. New York: Arno Press, 1972.

[History]

Turnese, David M. Approximations to Pi Using a Calculator. Mathematics Teaching 89: 38-39; December 1979.

How the calculator can extend understanding of pi is presented.

[Geometry, Secondary]

Tyler, Ken. Some Comments on Calculators in Junior Schools. Mathematics Teaching 90: 19-20; March 1980.

Comments from teachers on how they use calculators are quoted.

[Elementary, Roles, Teachers]

Valery, N. Coming of Age in the Calculator Business. New Scientist Calculator Supplement 68: 975; 1975.

[Status report]

Vannatta, Glen D. and Hutton, Lucreda A. A Case for the Calculator. Arithmetic Teacher 27: 30-31; May 1980.

The use of calculators by 38 intermediate-level classrooms in Indianapolis is described. Materials correlating calculator use with textbooks were provided for teachers. Results after two years of use indicated achievement "well above normal expectations" in computation

and problem solving.

[Achievement, Elementary (grades 4-6), Four-function calculators, Research]

Van Hamme, Willy. Emploi d'une calculatrice comme instrument d'apprentissage mathématique. Mathématique et Pédagogie 11/12: 101-112; March-June 1977.

[Activities]

Vergnaud, G. Activitié et connaissance opératoire. Bulletin de l'Association des Professeurs de Mathématiques 307: 52-65; 1977.

[Activities]

Vervoort, Gerardus and Mason, Dale J. Beginning Calculator Math. Belmont, California: Fearon Pitman Publishers, Inc.,1980.

[Activities]

Villers, C. Emploi de la calculatrice dans les premières années du secondiare comme instrument de calcul et d'apprentissage. Mathèmatique et Pèdagogie 11/12: 113-131; March-June 1977.

[Activities]

Vivet, M. and Laurent, J. P. La démonstration automatique des théorèmes: des résultats qui concernent l'enseignement des mathématiques. Bulletin de l'Association des Professeurs de Mathématiques 302: 93-106; 1976.

[Activities]

Vollaro, Joseph F. Quick and Easy Perspective Drawings. Machine Design 51: 105-108; May 1979.

A program for producing perspective drawings is described, with specific directions on how to proceed.

[Engineering, Post-secondary, Programmable calculators, Programming]

Waits, Bert K. The Mathematics of Finance Revisited Through the Hand Calculator. In Applications in School Mathematics. 1979 NCTM Yearbook. Reston, Virginia: National Council of Teachers of Mathematics, 1979. Pp. 109-124.

A variety of ways are provided to use the calculator to assist in teaching consumer mathematics applications.

[Activities, Consumer applications, Secondary]

Waits, Bert K. and Schultz, James E. An Iterative Method for Computing Solutions to Equations Using a Calculator. Mathematics Teacher 72: 685-689; December 1979.

Three problems involving iteration for solution are presented.

[Activities, Algebra, Scientific calculators, Trigonometry]

Walker, Jearl. Strange to Relate, Smokestacks and Pencil Points Break in the Same Way; Telescope Position Indicator that Uses a Pocket Calculator. Scientific American 240: 158-166; February 1979.

How to use the integrated circuit of a calculator as a device to indicate the position of a telescope is explained.

[Post-secondary, Science]

Warfel, Florence Amelia. The Teaching of First Term Calculus in Relationship to the Development of Electronic Computing Aids. (University of Pittsburgh, 1979.) Dissertation Abstracts International 41A: 146; July 1980.

Calculator use in college calculus courses is surveyed and described. Also, the effects of incorporating electronic aids in the calculus classroom are discussed.

[Achievement, Calculus, College, Curriculum, Research]

Watson, F. R. Mathematical Education and the Calculator. Journal of Science and Mathematics Education in Southeast Asia 2: 26-34; July 1979.

The possible impact of calculators on mathematics teaching is discussed with comments on the use in the United Kingdom.

[Elementary, References (selected), Roles, Secondary]

Watson, F. R. Exploring Numbers: Investigations with an Electronic Calculator. Teachers' Notes and Pupils' Materials, Series A - C. Staffordshire, England: University of Keele, 1979.

Suggestions are made for using the calculator as a "laboratory" for the exploration and investigation of number properties and patterns.

[Activities, Algebra, Functions, Junior high, Pattern searches, Properties, Secondary]

Wavrik, John. Programmable Calculators for Elementary School Students. Computing Teacher 6: 39-41; May 1979.

Storage registers in programmable calculators are discussed in this article.

[Calculator memory, Elementary, Programmable calculators, Programming]

Weaver, J. Fred. Third Grade Students' Performance on Calculator and Calculator-Related Tasks. Technical Report No. 498. Madison: Wisconsin Research and Development Center for Individualized Schooling, July 1979. ERIC: ED 176 992.

Refinements of work with calculator algorithms previously conducted by the author are reported. Work with "chaining" and the doing/undoing property in addition and subtraction was tested with 24 third-grade students. Results indicated the need for further instruction with both ideas. Students were able to manipulate the calculator keyboard, but had difficulty with the conceptualizations of the calculations to be executed.

[Addition, Algorithms, Elementary (grade 3), Research, Subtraction]

Weaver, J. Fred; Blume, Glendon W.; and Mitchell, Charles E. Calculator Explorations with Seventh Grade Students: Some Calculator-Inspired Instructional Materials, Observations, and Investigations. Technical Report No. 497. Madison: Wisconsin Research and Development Center for Individualized Schooling, July 1979. ERIC: ED 177 019.

Observations and instructional materials from calculator explorations with seventh-grade students from 1976 through 1978 are presented. Algebraic-logic calculators with no operational hierarchies were used; at the end of the year, RPN calculators were introduced.

[Activities, Junior high (grade 7), Research, Scientific calculators]

Weinstein, Martin Bradley. Machines That Can Talk. Radio Electronics 51: 44-46; April 1980.

[Selection]

Weir, Maurice D. An Introduction to the TI-59 Programmable Calculator. Monterey, California: Naval Postgraduate School, Department of Mathematics, 1979.

This book teaches a simple step-by-step method of programming a TI-59.

[College, Programmable calculators]

Werner, Marijane. The Hand-Held Calculator and Its Impact on Mathematics Curricula. School Science and Mathematics 80: 29-36; January 1980.

Suggestions from reports on calculators are presented, including conference recommendations.

[Recommendations, Roles]

West, Tommie A. The Effectiveness of Two Drill Strategies (Paper and Pencil, Electronic Calculator)in Facilitating the Learning of Basic Multiplication Combinations with Factors of 7, 8, or 9. School Science and Mathematics 80: 97-102; February 1980.

Ninety pupils in grades 4-6 were randomly assigned to calculator, paper-pencil, or control groups for two weeks. The calculator group used a preprogrammed "Matheputer." All groups made gains on multiplication fact tests, but the paper-pencil group improved most.

[Elementary (grades 4-6), Multiplication, Preprogrammed device, Research]

Wheatley, Charlotte L. Calculator Use and Problem-Solving Performance. Journal for Research in Mathematics Education 11: 323-334; November 1980.

This study compared the problem-solving performance of elementary school pupils using calculators with that of pupils not using calculators. The processes used by the two treatment groups were analyzed along with computational errors, production scores, and time-on-task. Two significant results from this study are: the calculator group

used more processes and made less computational errors than the non-calculator group.

[Elementary, Problem solving, Research]

Wheatley, Charlotte L. Calculator Use in the Middle Grades. School Science and Mathematics 80: 620-624; November 1980.

Four middle school calculator activities are presented that deal with estimation, problem-solving, application, and decimals.

[Activities, Elementary, Estimation, Decimals, Junior high, Problem solving]

Wheatley, Grayson H. Calculators in the Classroom: A Proposal for Curricular Change. Arithmetic Teacher 28: 37-39; December 1980.

Two proposals for the elementary mathematics curriculum are addressed: 1) shift from a computationally based curriculum to a conceptually oriented curriculum using the calculator as an instructional tool, and 2) eliminate the teaching of complex computations. Recommendations are made for curricular change, including what should be taught and the role of the calculator.

[Basic mathematics, Course description, Curriculum, Elementary, Recommendations, Roles]

Wheatley, Grayson H. and Shumway, Richard J. Impact of Calculators in Elementary School Mathematics. Final Report, National Science Foundation Grant No. SED77-18077, July 1979. ERIC: ED 175 720.

Two classes from each grade 2-6 in five locations participated, with one class at each level randomly assigned to the calculator group and the other to the non-calculator group. Both groups used the on-going program during the 18-week study. No significant differences were found between groups. Attitudes of the calculator group were favorable.

[Elementary (grades 2-6), Four-function calculators, Research]

Wheatley, Grayson, H.; Shumway, Richard J.; Coburn, Terrence G.; Reys, Robert E.; Schoen, Harold L.; Wheatley, Charlotte L.; and White, Arthur L. Calculators in Elementary Schools. Arithmetic Teacher 27: 18-21; September 1979.

No significant achievement differences were found between groups using or not using calculators in grades 2-6 in five states. Comments on calculator use are included.

[Elementary (grades 2-6), Four-function calculators, Research]

Wheeler, J.; Brown, L.; Ford, A.; Loomis, R.; and Nietupsk, J. Teaching Moderately and Severely Handicapped Adolescents to Shop in Supermarkets Using Pocket Calculators. Education and Training of the Mentally Retarded 15: 105; 1980.

[Consumer applications, Handicapped (mentally retarded), Secondary]

Williams, David E. Calculators: Catalyst or Crutch? Philadelphia

Association of School Administrators Points 8: 24-27; September 1979.

[Pros/cons]

Wilmet, J. Emploi de la calculatrice dans l'exposé de points théoriques (cycle supérieur). Evolution des programmes. Mathématique et Pédagogie 11/12: 113-141; March-June 1977.

[Activities, Numerical analysis]

Wilson, Jim. Loops. Calculators/Computers 2: 37-41; September-October 1978.

One worksheet illustrates loops using a calculator; another is for use with a computer.

[Activities, Elementary (grade 6), Junior high (grades 7-8)]

Winkelmann, Bernard. Hand-Held Calculators and Mathematics Educators: Some Strategic Perspectives. Presentation at ICMI Seminar on Calculators in School Teaching in Luxemborg, 29 May - 3 June 1978.

Consequences that result from the effects of calculators on society, the school, didactics, and mathematics education are presented.

[Algorithms, Curriculum, Functions, Problem Solving, Recommendations]

Woodward, Ernest and Hamel, Thomas. Calculator Lessons Involving Population, Inflation, and Energy. Mathematics Teacher 72: 450-457; September 1979.

Two lessons showing how a calculator can be used to help students discover the "rule of 72" and use it to investigate problems involving population, inflation, and energy are presented.

[Activities, Secondary]

Wundrow, Kenneth J. Store Decimals. Mathematics Teacher 70: 758-762; December 1977.

Four worksheets on bills and checks are given, with note that the calculator could be used to check work.

[Activities, Checking, Consumer applications, Junior high, Secondary, Worksheets]

Wyatt, J. Wendell; Rybolt, James F.; Reys, Robert E.; and Bestgen, Barbara J. The Status of the Hand-Held Calculator in School--Implications for Parents, Teachers and Administrators. Phi Delta Kappan 61: 217-218; November 1979.

See Reys et al. February 1980.

[Attitudes, Elementary, Research (survey), Secondary, Teachers]

Wynands, Alexander and Wickmann, Dieter. Testergebnisse und Auswertung 1979/1980. In Taschenrechner und Rechenfertigkeit. Paderborn, Federal Republic of Germany: FEOLL, 1980.

An investigation of the effects of calculator use in schools in West

Germany is presented, with details on the procedures, the tests, and the results.

[Achievement, Research]

Yvon, Bernard R. and Downing, Davis R. Math Explorations with the Simple Calculator. Portland, Maine: J. Weston Walch, 1978.

This text, appropriate for the elementary and junior high school students, presents games, puzzles, problems, and exercises for the four-function calculator.

[Activities, Four-function calculators, Games]

Yvon, Bernard,; Yvon, Joann; Yvon, Renne; and Yvon, Bernie. Calculator Fun: 44 Spirit Masters. Portland, Maine: J. Weston Walch, 1980.

[Activities]

Zakariya, Norma; McClung, Margo; and Winner, Alice-Ann. The Calculator in the Classroom. Arithmetic Teacher 27: 12-16; March 1980.

Three lessons using calculators in grades 3, 4, and 5 are outlined.

[Activities, Elementary (grades 3-5), Estimation, Numerical analysis, Subtraction]

Zastrocky, Michael R. Development and Implementation of a Diffusion Model Incorporating the Handheld Calculator into a Secondary Curriculum. (University of Northern Colorado, 1979.) Dissertation Abstracts International 40A: 4458; February 1980.

The model considered how calculators can be incorporated into a mathematics program. Systems commitment, needs assessment, goals, resources, training, evaluation, and dissemination were discussed.

[Curriculum, Research, Secondary]

Zink, Ronald Joseph. The Effects of Using a Programmed Printing Calculator to Improve the Computational Skills of Remedial Mathematics Students in Grades 7-12. (Columbia University Teachers College, 1979.) Dissertation Abstracts International 40A: 4942; March 1980.

One-hundred-eight students in grades 7-12 used drill-and-practice programs with or without calculators. No significant differences were found between treatments.

[Drill, Fractions, Preprogrammed devices, Programmed calculators, Remedial, Research, Secondary (grades 7-12)]

Zurflieh, Thomas P. Push-Button Math: A Look at Calculators in the Classroom. Technical Education News 38: 17-18; October-November 1978.

[Status report]

Zweng, Marilyn J. Children's Strategies of Solving Verbal Problems. Iowa City: University of Iowa, August 1979. ERIC: ED 178 359.

Several findings on calculator use were noted in this study on prob-

lem solving. Average and low ability students used calculators more often than high ability students. They were used most often on division problems.

[Elementary (grades 3-6), Problem solving, Research]

An Agenda for Action: Recommendations for School Mathematics of the 1980s. Virginia: National Council of Teachers of Mathematics, 1980. (See also: Mathematics Teacher 73: 473-480; September 1980; Arithmetic Teacher 28: 49-54; September 1980.

One of eight NCTM recommendations is that "mathematics programs must take full advantage of the power of calculators and computers at all levels." The NCTM acknowledges that computational skills are still necessary, but stresses the need to integrate calculator use at all levels, reinforces their usefulness in problem solving, notes the need for imaginative materials, and emphasizes the key component of teacher education.

[Recommendations]

Beginning a Calculator Program. In New Programs. Mathematics Teacher 73: 462; September 1980.

A high school calculator implementation program is described.

[Curriculum, Evaluation, Secondary, Units]

Calculateurs Programmables et Algèbre de Quatrième (une recherche inter-IREM) No. 24. Paris: Association des Professeurs de Mathematiques de l'Engseignement Public, May 1978.

Programmable calculator activities are presented for algebra.

[Activities, Algebra, Programmable calculators, Secondary]

Calculateurs programmable dans les collèges et les lycées.: experimentation menée par les IREM et l'INRDP. Recherches Pédagogiques 75: 31-74; 1975.

[College, Programmable calculators, Research]

Calculator Activities. Curriculum Research 18: 134; May 1979.

[Activities]

Calculator Information Center. Delta-K 20: 10-13; September 1980.

[References (selected)]

Calculator Worksheets. Lexington, Massachusetts: D. C. Heath, 1980.

The calculator worksheets are correlated with the Heath Mathematics student books and can be used for practice, problem-solving, enrichment, group work, new approaches to skills development, and homework.

[Basic mathematics, Elementary, Worksheets]

Calculators. Mechanix Illustrated 76: 80; March 1980.

Information on several types of calculators is included in this column.

[Selection]

General Purpose Calculator Ratings. Creative Computing 2: 18; January/February 1976.

Seventeen four-function and seven scientific calculators are rated according to keyboard and display performances.

[Four-function calculators, Scientific calculators, Selection]

Hewlett-Packard. Advanced Calculator Logic HP RPN/Algebraic: A Comparative Analysis. Corvallis, Oregon: Hewlett-Packard, 1979.

[Calculator logic, Programmable calculators]

Le Renouveau de L'Engseignement Francais des Mathematiques. No. 39. Paris: Association des Professeurs de Mathematiques, May-August 1980.

"Structure programming" of four-function calculators is discussed and examples of the iteration notion are given.

[Elementary, Four-function calculators, Iteration, Secondary]

Math Skills for the Real World: How to Use a Calculator. White Plains, New York: The Skills Group of the Center for Humanities, 1980.

Four sets of slides, audiodiscs and tapes, filmstrips, and worksheets provide a sequence for arithmetic, algebra, and trigonometry using the TI-30 calculator.

[Calculator keys, Drill, Kit, Secondary, Worksheets]

Mathematics: Texts and Supplements. Curriculum Review 18: 130-139; May 1979.

Reviews of three guidebooks using calculators for secondary school mathematics are included.

[Reviews, Secondary]

More Aids for the Calculating Amateur. Sky and Telescope 59: 381; May 1980.

Helpful publications are listed for the amateur astronomer who uses a programmable calculator.

[Astronomy, Programmable calculators, References (selected)]

New Entry in the Compact Calculator Derby. Consumer Report 43: 374-375; July 1978.

[Selection]

Paper No. 1: La calculatrice élémentaire. Paper No. 2: La calculatrice scientifique. Paper No. 3: La calculatrice programmable. A set of papers from the Seminar of the 1'U.C.L. on the Teaching of Mathematics. Belgium: du SEDIMA, Unité METH, 2 Chemin du Cyclotron. 1348 Louvain La Neuve,

[Activities, Algebra, Programmable calculators, Secondary]

Pocket Calculator Tricks. Creative Computing 2: 18; January/February 1976.

Three calculator tricks are presented that require the calculator to be turned around 180 to read the answer.

[Activities, Elementary, Games, Junior high]

School Mathematics Project Calculator Series. England: School Mathematics Project, 1979.

[Activities, Finance, Iteration, Roles]

Children and Calculators in the Classroom. Vancouver, British Columbia, Canada: Simon Fraser University, 1979.

[Activities]

Solar-powered Calculator Eliminates Batteries. Consumer Report 44: 4-5; January 1979.

[Selection]

Speech Plus Calculator-Telesensory Systems, Inc. Journal of Visual Impairment and Blindness 74: 235; June 1980.

[Selection]

Stationery, Typewriters, Calculators and Such. Consumer's Research Magazine Handbook of Buying Issue 72: 100-101; October 1979.

[Selection]

Texas Instruments. Sourcebook for Programmable Calculators. New York: McGraw-Hill, 1979.

[Programmable calculators]

INDEX

This index is designed to help the user locate references to designated areas of concern related to the use of calculators in education. It should be noted that the cross-referencing is not exhaustive: there may be other references which could be pertinent, but have been omitted due to oversight.

The following topics are included in the index:

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